Nicholas C. Borcherding, M.D., Ph.D.

Assistant Professor

Department of Pathology and Immunology · Division of Biology & Biomedical Sciences

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Updated January 25, 2026

Positions

- 2024–Present - **Clinical Assistant Professor of Pathology and Immunology**, Washington University in St. Louis — St. Louis, MO
- 2023–2024 - **Head of Computational Biology**, Omniscope — Barcelona, Spain
- 2022–2023 - **Senior Computational Biologist**, Santa Ana Bio — Alameda, CA

Education & Training

Education

- 2020 - M.D., Medicine Carver College of Medicine, University of Iowa
- 2020 - Ph.D., Cancer Biology Carver College of Medicine, University of Iowa
- 2014 - M.S., Pathology University of Iowa
- 2012 - B.S., Nutritional Sciences (summa cum laude) Iowa State University

Postgraduate Training

- 2024-07–Present - Fellow, Histocompatibility and Immunogenetics, Washington University School of Medicine
- 2020–2023 - Resident, Clinical Pathology, Washington University School of Medicine

Professional Licensure

- 2023: Medical License, Missouri, #2022049785 (Active)

Military Experience

- 2007–2013, U.S. Marine Corps, Sergeant , Retired

Consulting & Advisory

- 2024–Present - **Development Consultant**, Columbus Instruments, Columbus, OH
- 2024–Present - **Scientific Advisor**, Epana Bio, Inc, San Francisco, CA
- 2022–2023 - **Scientific Advisor**, Omniscope, Barcelona, Spain

Editorial & Peer Review

Editorial/Review Boards

Human Immunology (2025)

Ad Hoc Reviews

Cancer Discovery, Human Immunology, Journal of Clinical Investigations, Journal of Immunology, Journal of Open Source Software, Journal of Transplantation, Nucleic Acids Research, Nucleic Acids Research: Genomics & Bioinformatics, Nature Communications, Nature Machine Intelligence, Nature Methods, PLoS, PLoS Computational Biology, Science, Science Advances, Science Immunology

Service & Committees

Institutional

- 2025–Present - Residency Recruitment Committee, Department of Pathology and Immunology, Washington University St Louis.
- 2025–Present - Graduate Fellowship Review, Division of Biology & Biomedical Sciences, Washington University St Louis.
- 2024–Present - Faculty Search Committee, Department of Pathology and Immunology, Washington University St Louis.
- 2019–2020 - Alpha Omega Alpha Selection Committee, Carver College of Medicine, University of Iowa.
- 2016–2017 - LCME Accreditation Review Taskforce, Carver College of Medicine, University of Iowa.
- 2016–2017 - Medical Education Council, Carver College of Medicine, University of Iowa.
- 2015–2018 - Presidential Charter Committee for Recreational Services, University of Iowa.
- 2014–2018 - Research Council, University of Iowa
- 2013–2014 - Graduate Student Senate, University of Iowa

National

- 2025–Present - Inferred Allele Review Sub-committee (IARC), AIRR Community of the Antibody Society
- 2024–Present - Education Initiatives Committee, American Society for Histocompatibility and Immunogenetics
- 2016–2017 - First Aid/USMLErx Student Council

Mentorship

Research Mentorship

- **Qile Yang**, Undergraduate, 2023–Present: Computational immunology research resulting in two submitted publications
- **Isabel Risch**, MSTP Student, 2024–Present: HLA-B27 TCR profiling
- **Patty Hernandez**, Fellow, 2024–Present: HLA eplet comparison of commercial assays

Career Development

- **Haewon Shin**, Graduate Student, 2024–Present: Serving on thesis committee

Awards & Honors

- **2023**: Emerging Generation Award, American Society for Clinical Investigation
- **2021**: Paul E. Strandjord Young Investigator Award, Academy of Clinical and Laboratory Physicians and Scientists
- **2020**: Williams L. Roberts Young Investigator Award with Distinction, Academy of Clinical and Laboratory Physicians and Scientists
- **2020**: Special Achievement in Pathology, Iowa Pathology Society
- **2019**: Alpha Omega Alpha Honor Medical Society, Carver College of Medicine, University of Iowa
- **2018**: Hancher-Finkbine Medallion, University of Iowa
- **2018**: Wilderness Medicine Race, Carver College of Medicine, University of Iowa
- **2017**: Richard G. Lynch, MD Award for Pathology Research, Carver College of Medicine, University of Iowa
- **2017**: Cancer Center Research Award, Carver College of Medicine, University of Iowa

- **2017**: Wilderness Medicine Race, Carver College of Medicine, University of Iowa
- **2015**: ProQuest Hall of Scholars
- **2015**: L.B. Sims Outstanding Master's Thesis Award in Biological Sciences, Graduate College, University of Iowa
- **2015**: Richard G. Lynch, MD Award for Pathology Research, Carver College of Medicine, University of Iowa
- **2014**: Richard G. Lynch, MD Award for Pathology Research, Carver College of Medicine, University of Iowa
- **2013**: Cancer Center Research Award, Carver College of Medicine, University of Iowa
- **2012**: Departmental Scholarly Achievement Award, Department of Food Science and Human Nutrition, Iowa State University
- **2012**: University Graduation Marshall, Iowa State University
- **2012**: Graduation Ceremony Student Address, Department of Human Sciences, Iowa State University
- **2005**: Eagle Scout, Boy Scouts of America

Professional Memberships

- Member, Siteman Cancer Center at Barnes-Jewish Hospital (2025–Present)
- Member, Antibody Society (2025–Present)
- Member, Academy of Clinical Laboratory Physicians and Scientists (2024–Present)
- Member, American Society for Histocompatibility and Immunogenetics (2024–Present)
- Member, American Board of Pathology (2023–Present)
- Member, Alpha Omega Alpha Honor Society (2019–Present)

Software

- 2020 - **scRepertoire** — Author. Toolkit for single-cell immune repertoire analysis and visualization
- 2020 - **escape** — Author. Easy single cell analysis platform for enrichment
- 2023 - **Trex** — Author. T-cell receptor embedding and sequence analysis
- 2023 - **Ibex** — Author. B-cell receptor embedding and sequence analysis
- 2023 - **ClamBake** — Author. Metabolic estimation for CLAM cages, licensced to Columbus Instruments
- 2024 - **immApex** — Author. Tools for Adaptive Immune Receptor Sequence-Based Machine and Deep Learning
- 2025 - **immReferent** — Author. Reference interface to IMGT and OGRDB for immune receptor and HLA sequences
- 2025 - **bHIVE** — Author. B-cell Hybrid Immune Virtual Evolution model for artificial immune system simulation
- 2025 - **dandelionR** — Co-author. Single-cell immune repertoire trajectory analysis in R

Clinical Trials

- 2025–Present - **SPIRIT** (Sebia). Industry-sponsored FDA trial to validate an AI tool for aiding in immunosubtraction interpretation. Role: Site Investigator

Research Funding

Institutional

- 2017 - *Targeting mismatch repair for immunotherapy in basal-like breast cancer.* Oberley Seed Grant for Experimental Therapeutics. Role: **Co-PI**

- 2022-2023 - *Measuring intercellular mitochondria transfer with single-cell sequencing.* Interdivision Translational Research Department of Pathology, Washington University. Role: **Co-Investigator**
- 2025-2026 - *Identification of novel alloantibody targets in lung transplant recipients using phage display immunoprecipitation and sequencing.* Interdivision Translational Research Department of Pathology, Washington University. Role: **Principal Investigator**

National

- 2015-2016 - *Paracrine non-canonical Wnt signaling in breast cancer.* American Medical Association Foundation Research Seed Grant. Role: **Principal Investigator**
- 2017-2020 - *Paracrine non-canonical Wnt signaling in breast cancer.* NIH F30 CA206255. Role: **Principal Investigator**
- 2025- - *Harnessing Single-Cell T Cell-Receptor Sequencing to Accelerate Diagnosis in Inflammatory Arthritis.* Arthritis Research Program Focused Research Award, Department of Defense. Role: **Co-Investigator**

Invited Presentations

Institutional

- 2025 - *Computational approaches to the immune synapse.* Rheumatology Transplational Research Conference, Washington University in St. Louis, MO
- 2023 - *Single-cell characterization of the T follicular immune response in COVID-19 vaccination using deep learning.* Physician-Scientist Symposium, St. Louis, MO
- 2023 - *Transcriptional heterogeneity in cancer-associated regulatory T cells is predictive of survival.* Single-Cell RNA Sequencing Symposium, Iowa Institute of Genetics

National

- 2016 - *Paracrine regulation of breast cancer tumorigenesis.* Midwestern Association of Graduate Schools Conference, Chicago IL
- 2019 - *Single-cell profiling of cutaneous T-cell lymphoma reveals heterogeneity associated with disease progression.* Society for Investigative Dermatology Meeting, Chicago IL
- 2020 - *Single-cell mRNA sequencing of murine and human alopecia areata identifies immune cell profiles predictive of human disease state.* Academy of Clinical Laboratory Physicians and Scientists Meeting, Iowa City IA
- 2023 - *Single-cell characterization of the T follicular immune response in COVID-19 vaccination using deep learning.* Single Cell Club Montreal Meeting
- 2025 - *Bridging Biology and Bytes: The World of Computational Immunology.* Department of Immunology Grand Rounds, Mayo Clinic, Rochester MN
- 2025 - *AI for predicting the specificity of TCR.* ASHI Annual Meeting, Orlando FL

Conference Abstracts

- 2014 CD177, A novel metastasis suppressor of breast cancer Xie, Q., **Borcherding, N**., Kolb, R., & Zhang, W. American Association for Cancer Research Meeting, San Diego, CA
- 2014 Inflammasome activation in obesity-associated breast cancer progression Kolb, R., Liu, Y., Xie, Q., **Borcherding, N**., Li, W., & Zhang, W. American Association for Cancer Research Annual Meeting, San Diego, CA
- 2014 Wnt5a/ROR1 Axis in Triple Negative Breast Cancer Progression and Potential Therapy **Borcherding, N**., Kusner, D., Kolb, R., Xie, Q., & Zhang, W. American Association for Cancer Research Annual Meeting, San Diego, CA
- 2015 Paracrine Wnt5a signaling inhibits the expansion of tumor-initiating cells via Ryk/TGF R/Smad2

- **Borcherding, N**., Kusner, D., Kolb, R., Xie, Q., & Zhang, W. ASCI/AAP/APSA Joint Meeting, Chicago, IL
- 2015 NLRC4 inflammasome promotes breast cancer progression in diet-induced obese mice Kolb, R., **Borcherding, N**., Liu, Y., Yuan, F., Xie, Q., Sutterwala, F., & Zhang, W. American Association for Cancer Research Annual Meeting, Philadelphia, PA
- 2016 Obesity-induced Nlrc4 inflammasome promotes angiogenesis in breast cancer Kolb, R., Phan, L., **Borcherding, N**., Liu, Y., Yuan, F., Janowski, A.M., Xie, Q., Markan, K., Li, W., Potthoff, M., Fuentes-Mattei, E., Ellies, L., Knudson, M., Lee, M., Yeung, S., Cassel, S., Sutterwala, F., & Zhang, W. AACR Special Conference: The Function of Tumor Microenvironment in Cancer, San Diego, CA
- 2016 Calpain-5 expression in the retina localizes to photoreceptor synapses Schaefer, K.A., Toral, M., Velez, G., Cox, A., Baker, S., **Borcherding, N**., Colgan, D.F., Smits, M.M., Bondada, V., Mashburn, C.B., Yu, C., Geddes, J., Tsang, S.H., Bassuk, A.G., & Mahajan, V.B. FASEB Conference on the Biology of Calpains in Health and Disease, Big Sky, MT
- 2017 IL-1 promotes obesity-driven breast cancer progression through the upregulation of Angptl4 in adipocytes Kolb, R., Kluz, P., Wei, T.Z., Bormann, N., **Borcherding, N**., Markan, K., Pothoff, B., Tan, N.S., Sutterwala, F., & Zhang, W. Inflammation-driven Cancer: Mechanisms to Therapy Keystone Symposia, Keystone, CO
- 2017 Students Prefer 3D Anatomy Videos for Prelab Preparation Compared to Traditional Resources and Usage is Related to Class Performance Feagle, T., **Borcherding, N**., & Hoffmann, D. Experimental Biology Conference, Chicago, IL
- 2017 Targeting mismatch repair for basal-like breast cancer **Borcherding, N**., Jo, S., & Zhang, W. Cancer Biology Training Consortium Annual Meeting, Portland, OR
- 2018 Using data analytics to predict and improve cancer immunotherapy response **Borcherding, N**., Bormann, N., & Zhang, W. American Physician Scientist Association Midwest Regional Meeting, Iowa City, IA
- 2019 Single-cell profiling of cutaneous T-cell lymphoma reveals underlying heterogeneity associated with disease progression **Borcherding, N**., Voigt, A., Liu, V., Link, B.K., Zhang, W., & Jabbari, A. Society for Investigative Dermatology Annual Meeting, Chicago, IL
- 2019 Mapping immune landscape in clear cell renal carcinoma by single-cell genomics Vishwakarma, A., **Borcherding, N**., Chementi, M., Vishwakarma, P., Nepple, K., Salem, A., Jenkins, R.W., Zhang, W., & Zakharia, Y. AACR Special Conference on Tumor Immunology and Immunotherapy, Boston, MA
- 2020 WNT/-Catenin Signaling Correlates with Improved Survival in Luminal A Breast Cancer Cole, K., Councilman, K., Zhang, W., & **Borcherding, N.** USCAP Annual Meeting, Los Angeles, CA
- 2020 Virtual Anatomy Videos for Pre-Lab Preparation: Does Usage Correlate with Grade Outcomes Hoffmann, D., Feagle, T., & **Borcherding, N.** Experimental Biology Annual Meeting, San Diego, CA (Canceled due to COVID-19)
- 2020 Immune suppressive deficit in human Tc1 cells secondary to IL-12-induced pathways Renavikar, P., Sinha, S., Brate, A., Crawford, M., **Borcherding, N**., Steward, S., & Karandikar, N. Academy of Clinical Laboratory Physicians and Scientists Annual Meeting, Iowa City, IA
- 2020 Single-cell mRNA sequencing of murine and human alopecia areata identifies immune cell profiles predictive of human disease state **Borcherding, N**., Crotts, S., Ortolan, L., Bormann, N., & Jabbari, A. Academy of Clinical Laboratory Physicians and Scientists Annual Meeting, Iowa City, IA
- 2020 Preserving the in vivo metabolome and energy-sensitive phosphoproteome requires rapid freezing of tissue samples Rauckhorst, A.J., **Borcherding, N**., Kraus, A.S., Scerbo, D., & Taylor,

E.B. Metabolomics Association of North America Annual Meeting

- 2020 Combining single-cell and AIRR data **Borcherding, N.** Adaptive Immune Receptor Repertoire Society Annual Meeting
- 2021 Comprehensive transcriptional and clonotypic analysis of peripheral blood in Sezary syndrome reveals novel expression markers and shifting gene profiles associated with treatment **Borcherding, N**., Henderson, N., Ortolan, L., Liu, V., Link, B.K., Mangold, A., & Jabbari, A. United States and Canada Academy of Pathology Annual Meeting
- 2021 Comprehensive transcriptional and clonotypic analysis of peripheral blood in Sezary syndrome reveals novel expression markers and shifting gene profiles associated with treatment **Borcherding, N**., Henderson, N., Ortolan, L., Liu, V., Link, B.K., Mangold, A., & Jabbari, A. Society for Investigative Dermatology Annual Meeting
- 2021 Dissecting the complexity of heart infiltrates in post-infectious myocarditis induced with CVB3 infection by single-cell RNA sequencing analysis Lasrado, N., **Borcherding, N**., Arugmugam, R., Starr, T.K., & Reddy, J. American Association of Immunologists Annual Meeting
- 2023 Autoencoder, a Novel Computational Tool to Score T Cell Clones Demonstrates Biopsy T Cell Clones Are Not Represented in Peripheral Blood **Borcherding, N**., Leckie-Harre, A., Wu, H., Humphreys, B., & Malone, A. American Transplant Congress Annual Meeting
- 2023 Dietary lipids inhibit mitochondria transfer to macrophages to divert adipocyte-derived mitochondria into the blood **Borcherding, N**., Jia, W., Giwa, R., Field, R.L., Moley, J.R., Kopecky, B., Chan, M., Yang, B., Sabio, J., Walker, E., Osorio, O., Bredemeyer, A., Pietka, T., Alexander-Brett, J., Morley, S.C., Artyomov, M., Abumrad, N., Schilling, J., Lavine, K., Crewe, C., & Brestoff, J.R. American Society for Clinical Investigation Annual Meeting
- 2023 Integrated modeling of T cell repertoires to identify clonotype signatures of ICI response Melero, J., Colom-Sanmartí, B., Mendizabal-Sasieta, A., Perron, U., Grzelak, M., Pravdyvets, D., Soto, M., Nieto, J., Vidal, S., Tejpar, S., **Borcherding, N**., Planas-Rigol, E., & Heyn, H. ESMO Immuno-Oncology Congress
- 2024 Quantification of Brain Metastasis-Infiltrating T cells in Blood Using Ultra-Deep Single-Cell T Cell Repertoire Sequencing Planas-Rigol, E., Melero, J., Colom-Sanmartí, B., Bonfill-Teixidor, E., Arias, A., Grzelak, M., Pravdyvets, D., Sant, M., Martelotto, L., **Borcherding, N**., Heyn, H., & Seoane, J. American Association for Cancer Research Annual Meeting
- 2024 Integrated modeling of T cell repertoires to identify clonotype signatures of ICI response Melero, J., Colom-Sanmartí, B., Mendizabal-Sasieta, A., Perron, U., Grzelak, M., Pravdyvets, D., Soto, M., Nieto, J., Vidal, S., Tejpar, S., **Borcherding, N**., Planas-Rigol, E., & Heyn, H. Immuno-Oncology Summit Europe
- 2024 Ultra deep single-cell T cell receptor sequencing for cancer therapeutics and prognosis Melero, J., Grzelak, M., Pravdyvets, D., Soto, M., Mendizabal-Sasieta, A., Perron, U., **Borcherding, N**., & Heyn, H. LSX World Congress Annual Meeting
- 2024 Spatio-temporal tracking of therapy-induced T cell immunity against pediatric rhabdoid tumors Melero, J., Sentís, I., Cebria-Xart, A., Caratu, G., Grzelak, M., Soto, M., Rodríguez-Hernández, C., Mendizabal-Sasieta, A., Maspero, D., Pascual, A., Perez, J., Galan, R., **Borcherding, N**., Nieto, J., Avgustinova, A., & Heyn, H. Innovations in Single Cell Omics
- 2024 Liquid biopsy tracking of immunotherapy-induced T cell dynamics in MSS colorectal and endometrial tumors Heyn, H., Melero, J., Deuner, G., Baraibar, I., Grzelak, M., Caratú, G., García-Durán, C., Grau, F., García-Illescas, D., Fariñas, L., Paula Nieto, P., Morabito, S., Rotem, A., Casbas-Hernandez, P., Gros, A., Tabernero, J., Oaknin, A., Nieto, J., **Borcherding, N**., & Élez, E. ESMO Congress Annual Meeting
- 2025 Developing Flow Cytometry Crossmatch Thresholds: A Statistical Evaluation for Clinical Crossmatching Data **Borcherding, N**., Dajles, A., Martens, G., Clark, D., Taniguchi, M., & Liu,

C. Histocompatibility and Immunogenetics Annual Meeting

- 2025 A Robust AUC-Based Method for Eplet Calling in HLA Single Antigen Bead Assays: Reducing Variability and Enhancing Cohort-Level Profiling **Borcherding, N**., Martens, G., Taniguchi, M., & Liu, C. Histocompatibility and Immunogenetics Annual Meeting

Textbooks or Chapters

- 2016 Advanced Nutrition and the Regulation of Metabolism Schalinske, K., **Borcherding, N**., Rowling, M. ISBN: 978-1-5165-1468-7
- 2019 IL-1 signaling in the tumor microenvironment. Tumor Microenvironment Zhang, W., **Borcherding, N**., Kolb, R. ISBN: 978-3-030-34025-4
- 2020 Understanding and targeting human cancer regulatory T cells to improve cancer therapy. T Regulatory Cells in Health and Disease Kolb, R., **Borcherding, N**., Zhang, W. ISBN: 978-3-030-34025-4

Publications

1. Smazal AL, **Borcherding NC**, Anderegg AS, Schalinske KL, Whitley EM, Rowling MJ. Dietary resistant starch prevents urinary excretion of 25-hydroxycholecalciferol and vitamin D-binding protein in type 1 diabetic rats. The Journal Of Nutrition. 2013;143(7):1123-8. PMID:23677864
2. Zhang W, Tan W, Wu X, Poustovoitov M, Strasner A, Li W, **Borcherding N**, Ghassemian M, Karin M. A NIK-IKK module expands ErbB2-induced tumor-initiating cells by stimulating nuclear export of p27/Kip1. Cancer Cell. 2013;23(5):647–59. PMID:23602409
3. **Borcherding N**, Kusner D, Liu G, Zhang W. ROR1, an embryonic protein with an emerging role in cancer biology. Protein & Cell. 2014;5(7):496–02. PMID:24752542
4. Reed SM, Hagen J, Muniz VP, Rosean TR, **Borcherding N**, Sciegienka S, Goeken JA, Naumann PW, Zhang W, Tompkins VS, Janz S, Meyerholz DK, Quelle DE. NIAM-deficient mice are predisposed to the development of proliferative lesions including B-cell lymphomas. Plos One. 2014;9(11):e112126. PMID:25393878
5. Wu X, Zhang W, Font-Burgada J, Palmer T, Hamil AS, Biswas SK, Poidinger M, **Borcherding N**, Xie Q, Ellies LG, Lytle NK, Wu L, Fox RG, Yang J, Dowdy SF, Reya T, Karin M. Ubiquitin-conjugating enzyme Ubc13 controls breast cancer metastasis through a TAK1-p38 MAP kinase cascade. Proceedings Of The National Academy Of Sciences Of The United States Of America. 2014;111(38):13870-5. PMID:25189770
6. **Borcherding N**, Bormann N, Kusner D, Kolb R, Zhang W. Transcriptome analysis of basal and luminal tumor-initiating cells in ErbB2-driven breast cancer. Genomics Data. 2015;4:119–22. PMID:26167451
7. **Borcherding N**, Kusner D, Kolb R, Xie Q, Li W, Yuan F, Velez G, Askeland R, Weigel RJ, Zhang W. Paracrine WNT5A Signaling Inhibits Expansion of Tumor-Initiating Cells. Cancer Research. 2015;75(10):1972–82. PMID:25769722
8. Mahauad-Fernandez WD, **Borcherding NC**, Zhang W, Okeoma CM. Bone marrow stromal antigen 2 (BST-2) DNA is demethylated in breast tumors and breast cancer cells. Plos One. 2015;10(4):e0123931. PMID:25860442
9. Xie Q, Klesney-Tait J, Keck K, Parlet C, **Borcherding N**, Kolb R, Li W, Tygrett L, Waldschmidt T, Olivier A, Chen S, Liu G, Li X, Zhang W. Characterization of a novel mouse model with genetic deletion of CD177. Protein & Cell. 2015;6(2):117–26. PMID:25359465
10. Kusner D, **Borcherding N**, Zhang W. Paracrine WNT5A signaling in healthy and neoplastic mammary tissue. Molecular & Cellular Oncology. 2016;3(1):e1040145. PMID:27308558
11. Schaefer KA, Toral MA, Velez G, Cox AJ, Baker SA, **Borcherding NC**, Colgan DF, Bondada V, Mashburn CB, Yu C, Geddes JW, Tsang SH, Bassuk AG, Mahajan VB. Calpain-5 Expression in

the Retina Localizes to Photoreceptor Synapses. Investigative Ophthalmology & Visual Science. 2016;57(6):2509–21. PMID:27152965

12. **Borcherding N**, Cole K, Kluz P, Jorgensen M, Kolb R, Bellizzi A, Zhang W. Re-Evaluating E-Cadherin and -Catenin: A Pan-Cancer Proteomic Approach with an Emphasis on Breast Cancer. The American Journal Of Pathology. 2018;188(8):1910–20. PMID:29879416

13. **Borcherding N**, Kolb R, Gullicksrud J, Vikas P, Zhu Y, Zhang W. Keeping Tumors in Check: A Mechanistic Review of Clinical Response and Resistance to Immune Checkpoint Blockade in Cancer. Journal Of Molecular Biology. 2018;430(14):2014–29. PMID:29800567

14. Fleagle TR, **Borcherding NC**, Harris J, Hoffmann DS. Application of flipped classroom pedagogy to the human gross anatomy laboratory: Student preferences and learning outcomes. Anatomical Sciences Education. 2018;11(4):385–96. PMID:29283505

15. Liu Q, Kulak MV, **Borcherding N**, Maina PK, Zhang W, Weigel RJ, Qi HH. A novel HER2 gene body enhancer contributes to HER2 expression. Oncogene. 2018;37(5):687–94. PMID:29035388

16. Sinha S, **Borcherding N**, Renavikar PS, Crawford MP, Tsalikian E, Tansey M, Shivapour ET, Bittner F, Kamholz J, Olalde H, Gibson E, Karandikar NJ. An autoimmune disease risk SNP, rs2281808, in SIRPG is associated with reduced expression of SIRP and heightened effector state in human CD8 T-cells. Scientific Reports. 2018;8(1):15440. PMID:30337675

17. Vikas P, **Borcherding N**, Zhang W. The clinical promise of immunotherapy in triple-negative breast cancer. Cancer Management And Research. 2018;10:6823–33. PMID:30573992

18. Bi J, Yang S, Li L, Dai Q, **Borcherding N**, Wagner BA, Buettner GR, Spitz DR, Leslie KK, Zhang J, Meng X. Metadherin enhances vulnerability of cancer cells to ferroptosis. Cell Death & Disease. 2019;10(10):682. PMID:31527591

19. **Borcherding N**, Voigt AP, Liu V, Link BK, Zhang W, Jabbari A. Single-Cell Profiling of Cutaneous T-Cell Lymphoma Reveals Underlying Heterogeneity Associated with Disease Progression. Clinical Cancer Research : An Official Journal Of The American Association For Cancer Research. 2019;25(10):2996–05. PMID:30718356

20. Kolb R, Kluz P, Tan ZW, **Borcherding N**, Bormann N, Vishwakarma A, Balcziak L, Zhu P, Davies BS, Gourronc F, Liu L, Ge X, Jiang B, Gibson-Corley K, Klingelhutz A, Tan NS, Zhu Y, Sutterwala FS, Shen X, Zhang W. Obesity-associated inflammation promotes angiogenesis and breast cancer via angiopoietin-like 4. Oncogene. 2019;38(13):2351–63. PMID:30518876

21. Liu Q, **Borcherding N**, Shao P, Cao H, Zhang W, Qi HH. Identification of novel TGF- regulated genes with pro-migratory roles. Biochimica Et Biophysica Acta. Molecular Basis Of Disease. 2019;1865(12):165537. PMID:31449970

22. Pandey G, **Borcherding N**, Kolb R, Kluz P, Li W, Sugg S, Zhang J, Lai DA, Zhang W. ROR1 Potentiates FGFR Signaling in Basal-Like Breast Cancer. Cancers. 2019;11(5). PMID:31137681

23. **Borcherding N**, Bormann NL, Kraus G. scRepertoire: An R-based toolkit for single-cell immune receptor analysis. F1000research. 2020;9:47. PMID:32789006

24. **Borcherding N**, Crotts SB, Ortolan LS, Henderson N, Bormann NL, Jabbari A. A transcriptomic map of murine and human alopecia areata. Jci Insight. 2020;5(13). PMID:32453712

25. **Borcherding N**, Jethava Y, Vikas P. Repurposing Anti-Cancer Drugs for COVID-19 Treatment. Drug Design, Development And Therapy. 2020;14:5045–58. PMID:33239864

26. Crawford MP, Sinha S, Renavikar PS, **Borcherding N**, Karandikar NJ. CD4 T cell-intrinsic role for the T helper 17 signature cytokine IL-17: Effector resistance to immune suppression. Proceedings Of The National Academy Of Sciences Of The United States Of America. 2020;117(32):19408–14. PMID:32719138

27. Kluz PN, Kolb R, Xie Q, **Borcherding N**, Liu Q, Luo Y, Kim M, Wang L, Zhang Y, Li W, Stipp C, Gibson-Corley KN, Zhao C, Qi HH, Bellizzi A, Tao AW, Sugg S, Weigel RJ, Zhou D, Shen X, Zhang W. Cancer cell-intrinsic function of CD177 in attenuating -catenin signaling. Oncogene.

2020;39(14):2877–89. PMID:32042113

28. Liu Q, **Borcherding NC**, Shao P, Maina PK, Zhang W, Qi HH. Contribution of synergism between PHF8 and HER2 signalling to breast cancer development and drug resistance. Ebiomedicine. 2020;51:102612. PMID:31923801

29. Renavikar PS, Sinha S, Brate AA, **Borcherding N**, Crawford MP, Steward-Tharp SM, Karandikar NJ. IL-12-Induced Immune Suppressive Deficit During CD8+ T-Cell Differentiation. Frontiers In Immunology. 2020;11:568630. PMID:33193343

30. Swami U, Chennamadhavuni A, **Borcherding N**, Bossler AD, Mott SL, Garje R, Zakharia Y, Milhem M. Multivariable Analysis of 169 Cases of Advanced Cutaneous Melanoma to Evaluate Antibiotic Exposure as Predictor of Survival to Anti-PD-1 Based Immunotherapies. Antibiotics (Basel, Switzerland). 2020;9(11). PMID:33120998

31. Vikas P, **Borcherding N**, Chennamadhavuni A, Garje R. Therapeutic Potential of Combining PARP Inhibitor and Immunotherapy in Solid Tumors. Frontiers In Oncology. 2020;10:570. PMID:32457830

32. Wu VT, Kiriazov B, Koch KE, Gu VW, Beck AC, **Borcherding N**, Li T, Addo P, Wehrspan ZJ, Zhang W, Braun TA, Brown BJ, Band V, Band H, Kulak MV, Weigel RJ. A *TFAP2C* Gene Signature Is Predictive of Outcome in HER2-Positive Breast Cancer. Molecular Cancer Research : Mcr. 2020;18(1):46–56. PMID:31619506

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